

What is claimed is:

1. A position detection device comprising a position pointing means having a light reflection means; a light emitting means for emitting light to said light reflection means of said position pointing means; a light receiving means for receiving light from said light reflection means of said position pointing means; and a coordinate calculation means for calculating the position coordinate of said position pointing means based on information from said light receiving means, said position detection device being characterized in that:

said position pointing means has a pen-like shape, and has a movable pen-core portion changeable in its position according to the pressing pressure against the surface of a board, and a light modulation means for changing the characteristics of the reflection light, and a transmission means for transmitting to said light modulation means the displacement of said movable pen-core portion; and

said light receiving means has an up/down state detection means for obtaining up- and down-state information of said position pointing means by detecting the characteristics of light which have been changed by said light modulation means.

2. A position detection device according to claim 1, in which said light receiving means comprises at least two detection means with a predetermined space being provided therebetween, for obtaining information on incident angles of the light coming from said light reflection means, and said coordinate calculation means is adapted to calculate the position of said position pointing means based on a triangular principle from at least two incident angle information.

3. A position detection device according to claim 1, in which said light reflection means comprises a retroreflective means having retroreflective characteristics, and said light emitting means is disposed in the vicinity of said light receiving means so that the light from said light emitting means is retroreflected by said retroreflective means and is then incident on said light receiving means.

4. A position detection device according to claim 1, in which said light modulation means comprises a light shielding mechanism adapted to shield or block a part or all of the reflection light.

5. A position detection device according claim 1, in

which said light modulation means comprises a means which changes a light reflection area of said light reflection means.

6. A position detection device according to claim 1, in which said light modulation means comprises a means which changes intensity of the reflection light of said light reflection means.

7. A position detection device according to claim 1, in which said transmission means comprises a means which enlarges the amount of displacement of said movable pen-core portion and transmit it to said light modulation means.

8. A position detection device according to claim 1, in which said transmission means comprises a means which continuously changes the changing amount of the light modulation means according to the amount of displacement of said movable pen-core portion.

9. A position pointing means used in an optical position detection device, said position pointing means having a pen-like shape, and comprising:

a movable pen-core portion subject to displacement

by pressure on a board;

a light modulation means for changing characteristics of reflection light; and

a transmission means for transmitting the displacement of said movable pen-core portion to said light modulation means.

10. A position pointing means according to claim 9, in which said light modulation means comprises a light shielding mechanism which shields or blocks a part or all of the reflection light.

11. A position pointing means according to claim 9, in which said light modulation means comprises a means which changes light reflection area of said light reflection means.

12. A position pointing means according to claim 9, in which said light modulation means comprises a means which changes intensity of reflection light of said light reflection means.

13. A position pointing means according to claim 9, in which said transmission means enlarges the amount of displacement of said movable pen-core portion and trans-

mits it to said light modulation means.

14. A position pointing means according to claim 9, in which said transmission means comprises a means which continuously changes the changing amount of said light modulation means according to the amount of displacement of said movable pen-core portion.

15. A position detection method using a position detection device which comprises: a position pointing means having a movable pen-core portion and a light reflection means having a retroreflective member; a light emitting means for emitting the light to said light reflection means; a light receiving means for receiving the light from said light reflection means of the position pointing means; and a coordinate calculation means for calculating a position coordinate of said position pointing means based on information from said light receiving means, said method comprising the steps of:

emitting light from said light emitting means to the light reflection means of said position pointing means;

modulating light for changing characteristics of reflection light of said light reflection means based on displacement of said movable pen-core portion produced

from the pressure of said position pointing means by an operator onto a coordinate detection surface of said position detection device; and

detecting a pen-down state for obtaining the pen-up and pen-down information of said position pointing means by detecting with said light receiving means characteristics of the light changed by said light modulation means.

16. A position detection method according to claim 15, in which said pen-down state detecting step comprises a step of detecting a pen-down state based on the information of incident angles of light coming from said light reflection means of said position pointing means, said information being received by at least two light receiving means with a predetermined space being provided therebetween.

17. A position detection method according to claim 15, in which the light modulation in said light modulating step is performed by shielding or blocking a part or all of the reflection light.

18. A position detection method according to claim 15, in which the light modulation in said light modulating

step is performed by changing a light reflection area of said light reflection means.

19. A position detection method according to claim 15, in which the light modulation in said light modulating step is performed by changing the intensity of the reflection light of said light reflection means.

20. A position detection method according to claim 15, in which the light modulation step is performed by enlarging the displacement amount of said movable pen-core portion and then modulating the light.

21. A position detection method according to claim 15, in which the light modulation step is performed by continuously changing the changing amount of said light modulation means according to the amount of displacement of said movable pen-core portion.

22. A pen-down state detection method using a position detection device which comprises: a position pointing means having a movable pen-core portion and a light reflection means having a retroreflective member; a light emitting means for emitting the light to said light reflection means; a light receiving means for receiving

the light from said light reflection means of said position pointing means; and a coordinate calculating means for calculating a position coordinate of said position pointing means based on information from said light receiving means, said method for detecting as to whether a tip of said movable pen-core portion is in contact with a position coordinate detection surface comprising the steps of:

emitting light from said light emitting means to the light reflection means of said position pointing means;

modulating light for changing characteristics of reflection light of said light reflection means based on displacement of said movable pen-core portion produced from the pressure of said position pointing means by an operator onto said position coordinate detection surface of said position detection device; and

detecting a pen-down state for obtaining the pen-up and pen-down information of said position pointing means by detecting with said light receiving means characteristics of the light changed by said light modulation means.

23. A pen-down state detection method according to claim 22, in which said pen-down state detecting step



comprises a step of detecting a pen-down state based on the information of incident angles of light coming from said light reflection means of said position pointing means, said information being received by at least two light receiving means with a predetermined space being provided therebetween.

24. A pen-down state detection method according to claim 22, in which the light modulation in said light modulation step is performed by shielding or blocking a part or all of the reflection light.

25. A pen-down state detection method according to claim 22, in which the light modulation in said light modulation step is performed by changing the light reflection area of said light reflection means.

26. A pen-down state detection method according to claim 22, in which the light modulation in said light modulation step is performed by changing the intensity of the reflection light of said light reflection means.

27. A pen-down state detection method according to claim 22, in which the light modulation step is performed by enlarging the displacement amount of said mov-

able pen-core portion and then modulating the light.

28. A pen-down state detection method according to claim 22, in which said light modulation step is performed by continuously changing the amount of modulation of the light modulation according to the amount of displacement of said movable pen-core portion.